

**POST GRADUATE DIPLOMA IN
COMPUTER APPLICATIONS
(PGDCA-NEW)**

Term-End Examination

December, 2022

MCS-202 : COMPUTER ORGANISATION

Time : 3 Hours

Maximum Marks : 100

***Note :** Question Number 1 is compulsory and carries 40 marks. Attempt any **three** questions from Question No. 2 to Question No. 5.*

1. (a) Perform the following operations using signed 2's complement notation using 8 bit registers. (All the numbers given below are in decimal notation). Also indicate overflow, if any :

(i) Add (-59) with (-69)

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P. T. O.

- (ii) Subtract (-69) from (-59)
- (iii) Add $+59$ with $+69$
- (iv) Add -75 and 35
- (b) Simplify the following Boolean expressions :
- 4
- (i) $(A + B)' + (A' + B)'$
- (ii) $((AB)' + (A'B)')'$
- (c) Explain how data is organised in a magnetic disk with the help of a diagram. Also differentiate between Constant Linear Velocity (CLV) and Constant Angular Velocity (CAV) disks. 6
- (d) Explain the programmed I/O with the help of a diagram. 4
- (e) Explain different components of an instruction of a computer system. Explain the subroutine call and return instructions with the help of sequence of operations that would be required to implement these instructions. 6

- (f) Explain the organisation of control memory with the help of a diagram. 5
- (g) Explain the PUSH instruction of 8086 microprocessor with the help of an example. 3
- (h) Write a program using 8086 assembly language that converts a 2-digit ASCII number stored in memory to equivalent binary number. 6
2. (a) Explain the Von Neumann architecture with the help of a diagram. Differentiate the features of Von Neumann architecture with the Harvard architecture. 7
- (b) Simplify the following Boolean function Product of Sum (SOP) form using K-map. Draw the logic diagram of the resulting function : 6
- $$F(A, B, C, D) = \Sigma (0, 4, 5, 6, 8, 14, 15)$$
- (c) Explain the J-K flip-flop with the help of a block diagram and characteristic table. Make the excitation table of J-K flip-flop.

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3. (a) What is cache memory ? Why is it needed ?
If hit ratio of a cache memory is 80% and cache access time and memory access time for that machine are 5 nanoseconds and 100 nanoseconds respectively, then find the effective memory access time for this system. 5
- (b) Explain the 'set-associative mapping' scheme of main memory to cache addresses with the help of a diagram showing how a main memory address can be mapped to cache address. 7
- (c) Explain the features of the following I/O devices or components : 8
- (i) Scanner
 - (ii) Video Memory
 - (iii) Digital Camera
 - (iv) LEDs

4. (a) Define the term micro-operation. Explain the following micro-operations with an example of each : 7
- (i) Register-transfer micro-operation
 - (ii) Arithmetic micro-operation
 - (iii) Logic micro-operation
 - (iv) Shift micro-operation
- (b) Differentiate between hardwired control unit and micro-programmed control unit. Explain the functioning of Wilke's control unit with the help of a diagram. 7
- (c) List the features of RISC architecture. Explain the instruction pipelining in the context of a RISC architecture. 6
5. (a) Explain the use of segment registers in 8086 microprocessor with the help of examples. 5
- (b) Explain the use of INT 21h in the context of 8086 microprocessor for performing input and output operations with *one* example of each. 5

- (c) Write a program using 8086 assembly language that finds the highest value in an array of 5 unsigned byte values stored in the memory. 7
- (d) Explain the concept of vector processing with the help of an example. 3